Idle Reduction Projects for the Advanced Vehicle Testing Activity

Ken Proc, Project Leader, Fleet Test and Evaluation

Center for Transportation Technologies & Systems
National Renewable Energy Laboratory
November 17, 2004

Outline

- Overview of Activities to Date
- Evaluation and Validation Projects
- Solicitation for Truck OEM Factory Installation
- Future Activities

On-Board Idle Reduction Technologies for Heavy-Duty Trucks

GOAL: To maximize the introduction and use of idle reduction technologies in heavy-duty trucks

Objectives

1. Develop objective in-use information on the performance of on-board idle reduction technologies
2. Identify and implement strategies to overcome critical cost barriers
3. Conduct education and outreach

AVTA's Idle Reduction Technologies Activities to Date

- Worked with trucking industry stakeholders to identify issues hindering introduction of idle reduction technologies
- Conducted Government/Industry conference & workshops
- Developed technology demonstration plan
- Awarded 3 data collection/technology validation projects
- Issued solicitation for truck OEM on-line installation
- Supporting development of the National Idling Reduction Plan

Idle Reduction Technologies Data Collection Validation Projects

GOAL: To gather objective in-use information on the performance of available technologies

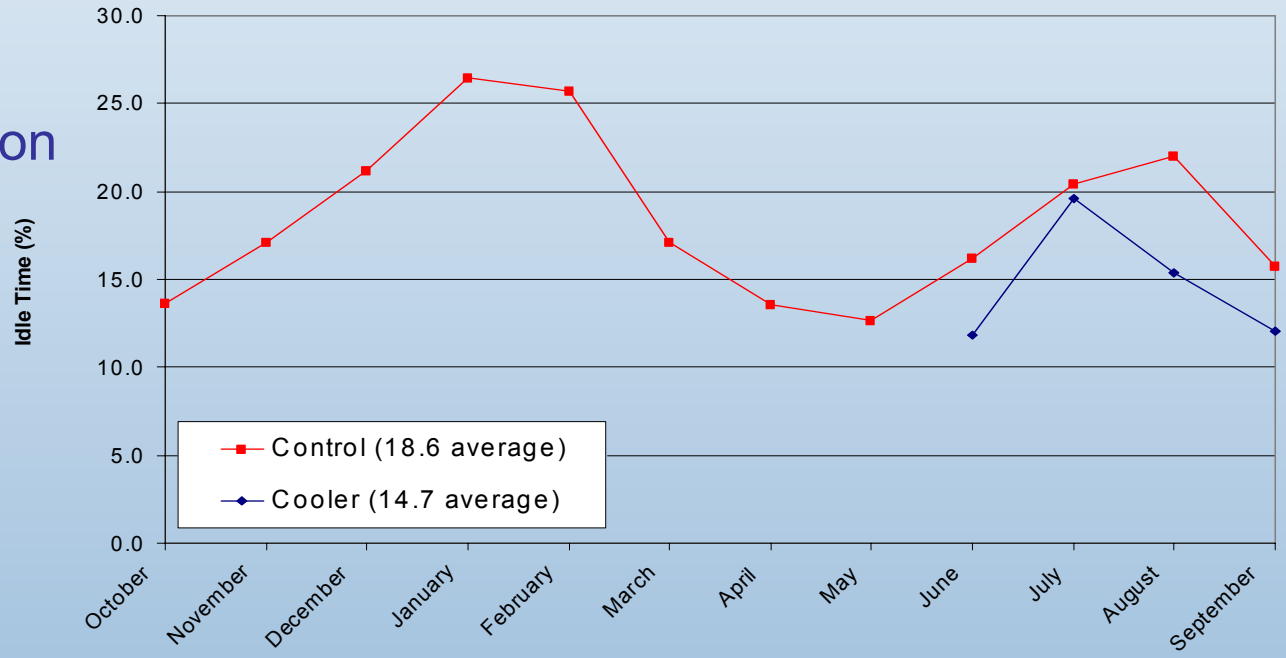
- Specifications and costs
  - System descriptions
  - Capital and installation costs
  - Payback period
- Vehicle operation
  - Fuel consumption (truck idle and idle reduction system)
  - Engine oil consumption and changes
  - Maintenance (truck and idle reduction system)
- Other evaluation information
  - Engine and component wear
  - Resale value
  - User impressions

Schneider National Evaluation Project

- Demonstration team: Schneider, Freightliner, Webasto
- Trucks idle approximately 480 hrs/year
- Cooling (19 trucks)
  - New product utilizes phase change medium
  - Charged during normal operation using existing AC
- Cab heater (100 trucks)
  - Diesel-fueled air heater
  - Offered as OEM option
- 4Q FY03- 2Q FY05
  - Extension awarded to continue testing

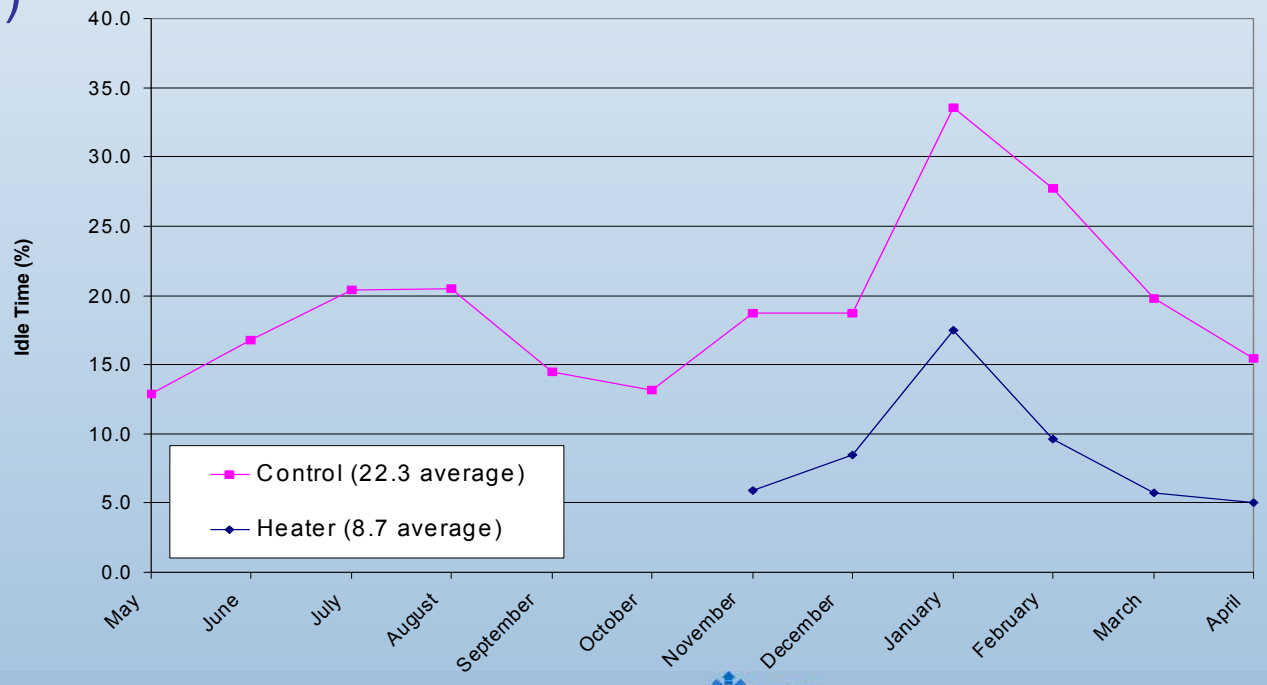
Schneider National Evaluation Project

- Cab cooling performance and results (Jun – Sep 03)
  - Provided 10 hrs of cooling up to 85°F ambient; 7 hrs at 90°F
  - Cab cooler trucks idling time 15% vs. 19% for control trucks
  - No measured fuel economy benefit (7.0 MPG for both test and control trucks)
- Issues
  - Lack of insulation
  - Poor airflow
  - Difficult install



Schneider National Evaluation Project

- Cab heating performance and results (Nov 03 – Apr 04)
  - Heated cab at 70°F in ambient temperatures down to 0°F
  - Cab heater trucks idling time 9% vs. 22% for control trucks
  - 2% improvement in fuel economy (6.7 MPG for heated vs. 6.5 MPG for control)
- Issues
  - Lack of temp. adjustment
  - 5% failures



Caterpillar MorElectric Technology Evaluation

- Team: Caterpillar, International Truck, and Cox Transfer
- 5 new MorElectric™ trucks; 5 new control
- Trucks idle about 1830 hrs/year
- Electrically-driven accessories
  - On-road operation more efficient
- Three main components
  - HVAC unit
  - Generator
  - Auxiliary Power Unit (APU)
- Project runs 4Q FY03- 4Q FY05
  - Project extension awarded to continue testing through 4Q FY07

Caterpillar MorElectric Technology Evaluation

- Accomplishments
  - Caterpillar and International completed engineering design work required for installation
    - Selected 2-piece HVAC design to minimize vehicle modifications and address weight distribution issues
    - Designed interface wiring
- Status
  - First test truck built and undergoing initial validation testing
  - Remaining four trucks to enter service by end of November 2004

Espar Heater and Electric AC Evaluation

- Team: Espar, International Truck, and Wal-Mart
- 20 trucks with combined heating and cooling systems
- At least 2 control trucks
- Bunk heater
  - Diesel fueled air heater

- Engine pre-heater
  - Diesel fueled coolant heater

- Roof-mounted electric air conditioner
  - Operates on starting or auxiliary batteries
- Project awarded September 2004
- Installation of equipment is underway

Solicitation for Truck OEM Factory Installation

- Develop full-function IR technology as factory option
- Integrate into on-board design and assembly by MY07
- Demonstrate cost savings versus aftermarket installation
- Document fully
- Teams should include truck OEM (lead), IR device manufacturer, fleet
- $300-500K total funding, 2-3 awards, 50/50 cost-share
- Project duration 2-3 years
- Award late 2Q, FY05

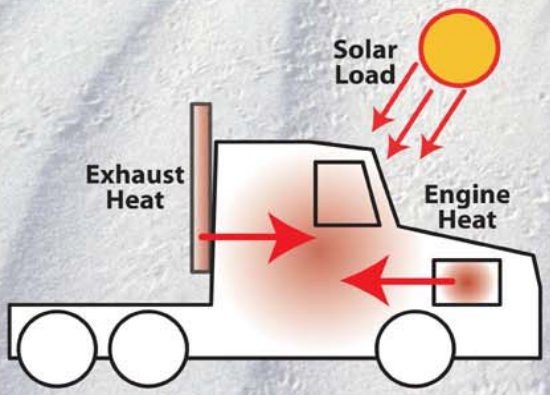
AVTA's Future Activities for Idle Reduction Technologies

- Education and outreach (FY04-FY05)
- Coordinate with Idle Elimination Manufacturers Association in addressing policy and institutional barriers (FY04-FY05)
- Extend data collection/demonstration projects (FY06, if warranted and funding available)
- Additional solicitation for on-line installation of idle reduction technologies at truck OEMs targeting year 2008 emission and fuel consumption requirements (FY06, if warranted and funding available)
- CoolCab

Reducing Truck Idling Through Enhanced Cab Thermal Management

THE CHALLENGE

Most cab climate control systems require idling to provide thermal comfort



Varying thermal conditions inhibit use of idle reduction technologies

THE SOLUTION

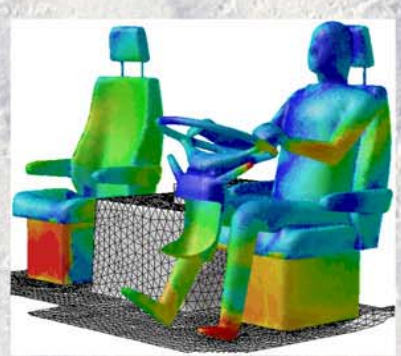
Design efficient thermal management systems that keep the cab comfortable without the need for engine idling

- **Reduce thermal load**
- **Focus on occupant comfort**
- **Improve equipment efficiency**

Solar Reflective Glazings

Testing

Thermal Comfort Evaluation



Integrated Numerical Modeling

Air Conditioner Efficiency

For More Information

- Status Report on Idle Reduction Technology Demonstrations
  - www.avt.nrel.gov/idle.html